REMARKS

Applicant thanks the Examiner for carefully considering the subject application.

1. Fuel Shut-Off Operation Distinguished from Engine or Vehicle "Shut Down."

The Rejection has applied Oguma et al. (U.S. 6,494,037) and Poggio et al. (U.S. 6,226,982) to the pending claims. Specifically, it appears that the Rejection has relied on a broad interpretation of "shut down" to include engine fuel shut-off operation.

Therefore, claim 15 has been amended to make clear that the shut down state is restricted to a condition where the engine is off. In other words, this includes a condition where the engine is stopped so that there is no flow of exhaust gas, such as when the vehicle is turned off. See Applicant's specification, pg. 28, line 7 to pg. 29, line 4, for example, as well as Figure 6. This is opposed to fuel shut-off operation where the engine continues to turn without fuel injection. This should be clear because even Applicant's specification distinguishes between "fuel shut-off mode" and the more specific shut down condition. See Applicant's specification, pg. 45, line 24, for example. As such, Applicant's use of "shut down," as now amended in Claim 15, should not be construed as fuel shut-off operation where the engine continues to turn without fuel injection.

Applicant has also amended claim 15 to make clear that the estimated oxidant storage is based on an emission control device state during a previous shut-down.

Claim 23 has also been amended to make clear that the shut down condition is a vehicle shut down condition. Likewise, claim 29 has been amended to include a vehicle shut down.

Turning initially to Poggio et al. (U.S., 6,226,982), Applicant believes that no further discussion of this reference should be needed in view of the clarifying remarks above. Poggio et al. admittedly deals with fuel shut-off conditions. Thus, it is simply not applicable to the pending claims.

Regarding the remaining reference of Oguma et al., Applicants respectfully submit that for the reasons set forth below, Oguma et al. is also inapplicable to the pending claims.

2. Claim 23

Claim 23 is reproduced below for ease of reading. It states:

> An emission control system of an internal combustion engine, comprising:
> an emission control device disposed in an exhaust passage of the internal combustion engine; and
> a controller determining an oxidant storage amount in said emission control device, said determined oxidant storage amount based on a shut down state time and temperature of said emission control device, where the shut down state is a vehicle shut down; and adjusting a fuel injection amount into the internal combustion engine based on said determined oxidant storage during starting.

The Examiner asserts that the features of Claim 23 are shown by Oguma et al. at page 3:

> Re claim 23, as shown in Figures 1, 3, 5, and 12, Oguma et al. disclose an emission control system of an internal combustion engine, comprising:
>
> - an emission control device (3) disposed in an exhaust passage of the internal combustion engine; and
>
> - a controller (6) determining an oxidant storage amount in the emission control device, the determined oxidant storage amount based on a shut down state time and temperature of the emission control device (when the engine is started, an initial high speed component of oxygen storage amount (HO2INT) is determined based on a catalyst temperature (see Figure 3 at least lines 11-22 of column 5), and an initial low speed component of oxygen storage amount (LO2INIT) is set equal to LO2MAX even if the engine is restarted immediately after an engine stop (lines 1-6 of column 11)); and adjusting a fuel injection amount into the internal combustion engine based on the determined oxidant storage during starting (see Figure 12).

However, Applicant respectfully submits that the Examiner has misinterpreted the cited disclosure of Oguma et al. by stating that it shows determining an oxidant storage amount based on a shut down state time. In actuality, Oguma et al. teach the exact opposite by describing a method that ignores the shut down time.

Specifically, Oguma et al. use the same value for the initial stored oxygen whether or not the restart is immediate. In fact, while the Examiner only cites lines 1-6 of Col. 11, if one goes on to read the very next two sentences this fact becomes clear. In these sentences, Oguma et al. acknowledge that their approach is erroneous. Yet, Oguma et al. state that even so, it is the approach to be taken. For ease, the full citation is produced below, and the additional two sentences are highlighted:

> After the engine **1** stops, when the engine restarts immediately, diffusion of air from the outlet of the exhaust passage does not proceed and the low speed component does not reach the maximum capacity, but even in this case, the low speed component is reset to the maximum capacity LO2MAX. In other words, the computation value of the low speed component LO2 immediately after startup contains an error. However, even in this case, the computation value is reset to the minimum capacity (FIG. **11**) when the exhaust flowing out from the catalyst **3** has become rich, so computational errors in the low speed component are all eliminated.

As such, Oguma et al. expressly teach that the amount of time the engine is shut down should be ignored, and the same maximum value should be used even though is it wrong.

In contrast with Oguma et al., Applicant has found that shut down time may be advantageously used in determining the initial oxidant storage amount. In this way, a more accurate initial value can be obtained that avoids the errors *admittedly* experience by Oguma et al. And while Oguma et al. believe that its errors will eventually be eliminated when the engine operates rich, Applicant's system has no such errors during the critical engine starting period, and can provide improved emission control as the shut down time varies. Further, Applicant's approach does not require waiting until rich operation occurs to correct the error, which may be well after the critical engine starting during which a majority of tailpipe emissions occur. As such, Claim 23 is not anticipated by Oguma et al.

3. Claim 29

Claim 29 is reproduced below for ease of reading. It states:

> An emission control system of an internal combustion engine, comprising:
> an emission control device disposed in an exhaust passage of the internal combustion engine; and
> a controller determining an initial oxidant state of said emission control device, said initial oxidant state based on an oxidant state before vehicle shut down; and adjusting a fuel injection amount into the internal combustion engine based on said initial oxidant state during engine starting.

The Examiner asserts that the features of Claim 29 are shown by Oguma et al. at page 4:

> Re claim 29, as illustrated in Figures 1, 3, 5, and 12, Oguma et al. disclose emission control system of an internal combustion engine, comprising:
>
> - an emission control device (3) disposed in an exhaust passage the internal combustion engine; and
>
> - a controller (6) determining an initial oxidant state of the emission control device, the initial oxidant state based on an oxidant state before shut down (the low speed component of oxygen storage amount (LO2) is set at its maximum level (LO2MAX) before the vehicle is turned off and its initial value (LO2INIT) is kept at this level at the startup of the engine); and adjusting a fuel injection amount into the internal combustion engine based on the initial oxidant state during starting (see Figure 12).

Applicants have reviewed Figure 12, as well as the corresponding text, but can find no disclosure that shows the low speed component LO2 set at its maximum level before the vehicle is turned off. While Oguma et al. do set LO2 to its maximum value during startup, this does not anticipate claim 29.

Claim 29 advantageously uses the oxidant state before vehicle shut down to obtain a more accurate estimate of the oxidant state at start up. As discussed above, Oguma et al. set the low speed component LO2 to its maximum value, irrespective of the catalyst state at a previous shut down condition or any other parameter. Therefore, Oguma et al. does not anticipate claim 29.

4. Claim 15

Claim 15 is similar to claim 29 in that the determined oxidant storage state is based on a shut down state of the emission control device at a previous shut down condition. As noted above, Applicants can find no such disclosure in Oguma et al.

5. Conclusion

The remaining claims depend from one of the above independent claims and therefore should be allowed.

Based on the foregoing comments, the above-identified application is believed to be in condition for allowance, and such allowance is courteously solicited. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is courteously requested to contact the undersigned by fax or telephone at the number listed below.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account No. 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505. A duplicate copy of this sheet is enclosed.

CERTIFICATE OF MAILING

I hereby certify that the attached documents are being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on September 29, 2004.

Lauren Barberena

Respectfully submitted,

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